ORDER NO. SD7804-1347

Service Manual

Frequency Generator Servo Automatic Turntable System

SL-230 (X),(XAL),(E), (XGE),(XG),(XGF) /SL-231 (E),(X),(XAL), (XG),(XGF)

* The model SL-230(X) is available in Asia, Latin America, Middle East and Africa only.
* The model SL-230(XAL) is available in Australia only.
* The model SL-230(E) is available in Scandinavian only.
* The model SL-230(XGE) is available in England only.
* The model SL-230(XG) is available in European only.
* The model SL-230(XGF) is available in France only.
* The model SL-231(E) is available in Scandinavian only.
* The model SL-231(X) is available in Asia, Latin America, Middle East and Africa only.
* The model SL-231(XAL) is available in Australia only.
* The model SL-231(XG) is available in European only.
* The model SL-231(XGF) is available in France only.
* SL-230 is of silver finish.
* SL-231 is of black finish.

Specifications

(Specifications are subject to change without notice for further improvement.)

General

Power supply:	~110-120/220-240V, 50/60 Hz
Power consumption:	3W
Dimensions: (W x H x D)	43.0 x 12.6 x 37.5 cm (16-59/64 x 4-31/32 x 14-49/64 inches)
Weight:	4.6 kg (10.1 lb.)

Turntable section

Type:	Frequency Generator Servo Automatic Turntable System(Auto-start, Auto-return, Auto-stop, Repeat play and Manual play)
Drive method:	Belt drive
Motor:	Frequency Generator Servo DC motor
Turntable platter:	Aluminum die-cast, 30.4 cm (12")
Turntable speeds:	33-1/3 and 45 rpm
Pitch controls:	Individual adjustment controls, 6% adjustment range
Wow and flutter:	0.045% WRMS (JIS C5521) ±0.06% peak (IEC 98A Weighted)
Rumble:	−70 dB (IEC 98 Weighted)

Tonearm section

Type:	Universal tubular arm, staticbalanced type
Effective length:	230 mm (9-1/16")
Overhang:	15 mm (19/32")
Friction:	Within 7 mg (horizontally and vertically)
Effective mass:	13 g (without cartridge)
Tracking error angle:	Within 2°32' (at the outer groove of 30 cm (12") record)
	Within 0°32' (at the inner groove of 30 cm (12") record)
Offset angle:	22°
Adjustable stylus pressure range:	0 to 3 g (stylus pressure direct reading type)
Cartridge weight range:	5.5 to 8.5 g (14.5 ~ 17.5 g including headshell)
Headshell weight:	9 g

Cartridge section

Model No.:	EPC-270C-X
Type:	Moving magnet
Frequency response:	20 Hz to 25 kHz −3 dB 20 Hz to 15 kHz ±2 dB
Output voltage:	3.2 mV at 1 kHz 5 cm/sec. zero to peak lateral velocity (6.4 mV at 1 kHz, 10cm/sec. zero to peak lateral velocity [DIN 45500])
Channel separation:	25 dB at 1 kHz
Channel balance:	Within 2 dB at 1 kHz
Compliance (dynamic):	10×10^{-6} cm/dyne at 100 Hz (CBS STR-100)
Stylus pressure:	1.75 ±0.25 g (17.5 ±2.5mN)
Load impedance:	47 kΩ to 100 kΩ
Weight:	6.0 g (cartridge only)
Replacement stylus:	EPS-270ED

Technics

Matsushita Electric Trading Co., Ltd.
P.O. Box 288, Central Osaka Japan

SL-230

TECHNISCHE DATEN

Spezifikationen Können infolge von Verbesserungen ohne Ankündigung geändert werden.

Allgemeine Daten

Netzspannung:	~110-120/220-240V, 50/60 Hz Wechselstrom
Leistungsaufnahme:	3W
Abmessungen: (B x H x T)	43,0 x 12,6 x 37,5 cm
Gewicht:	4,6 kg

Plattenspielerteil

Typ:	Frequenzgenerator-Servo-Automatik-Plattenspieler-System (Auto-Start, Auto-Rückkehr, Auto-stop, wiederholtes Abspielen und manuelles Abspielen)
Antrieb:	Riemenantrieb
Motor:	Frequenzgenerator-Servo-Gleich-Strommotor
Plattenteller:	Aluminium-Spritzguß 30,4 cmø
Plattenteller-Drehzahlen:	33-1/3 und 45 U/min
Geshwindigkeits-Feineinstellung:	Für jede Geschwindigkeit gesondert mittels Einsteller, 6% Einstellbereich
Gleichaufschwankungen:	0.045% WRMS (JIS C5521) ±0,06% bewertet Null-zu-Spitze (IEC 98A bewertet)
Rumpel-Geräuschspannungsabstand:	−70 dB (IEC 98A bewertet)

Tonarmteil

Typ:	Universal-Rohrtonarm, statisch ausbalanciert
Effektive Länge:	230 mm
Überhang:	15 mm
Spurfehlwinkel:	Innerhalb 2°32' (bei der äußeren Rille einer 30 cm-Schallplatte) Innerhalb 0°32' (bei der inneren Rille einer 30 cm-Schallplatte)
Kröpfungswinkel:	22°
Mechanischer Widerstand:	weniger als 7 mg (horizontal, vertikal)
Effektive Masse:	13 g (ohne Tonabnehmer)
Auflagedruck-Einstellbereich:	0 – 3 g (direkt ablesbare Eirstellung)
Zulässiger Tonabnehmer-Gewicht-bereich:	5,5 – 8,5 g 14,5 – 17,5 g (einsch ließlich Tonarmkopf)
Tonarmkopf-Gewicht:	9 g

Tonabnehmerteil

Modell-Nummer:	EPC-270C-X
Typ:	Magnetischer Tonabnehmer
Frequenzgang:	20 Hz to 25 kHz −3 dB 20 Hz to 15 kHz ±2 dB
Ausgangsspannung:	3,2 mV bei 1 kHz 5 cm/sec Null-zu-Spitze, lateral 6,4 mV bei 1 kHz 10cm/sec Null-zu-Spitze, lateral, (DIN 45500)
Kanaltrennung:	25 dB bei 1 kHz
Kanalabweichung:	Innerhalb 2 dB bei 1 kHz
Nachgiebigkeit (dynamisch):	10×10^{-6} cm/dyn bei 100 Hz (CBS STR-100)
Auflagekraft:	1,75 ±0,25 g (17,5 ±2.5 mN)
Impedanz:	47 kΩ bis 100 kΩ
Gewicht:	6,0 g (ohne Tonarmkopf)
Ersatznadel:	EPS-270ED

CARACTERISTIQUES TECHNIQUES

Sujet à changement sans préaris.

Généralités

Alimentation:	Alternatif 110-120/220-240V, 50 ou 60 Hz.
Consommation:	3W.
Dimensions: (LxHxP)	43,0 x 12,6 x 37,5 cm.
Poids:	4,6 kg.

Platine de lecture

Type:	Systém de platine automatique servo reglable à générateur de fréquences. (Auto-démarrage, Auto-retour, Auto-arrêt, Audition répétée et Audition manuelle).
Système d'entraînements:	Entraïnement par courroie.
Moteur:	Servo moteur C.C. á générateur de fréquences.
Plateau de lecture:	Aluminium moulé sous pression. Diamètre 30,4 cm.
Vitesses de rotation:	33-1/3 et 45 t/p.m.
Commandes de précision de la vitesse:	Commandes de réglage individuelles; plage de réglage de 6%.
Pleurage et scintillement:	0,045% de valeur efficace (JIS C5521).
Ronflement:	±0,06% de crête (IEC 98A Pondéré). −70 dB (IEC 98A Pondéré).

Bras de lecture

Type:	Bras tubulaire universel, de type à équilibrage statique.
Longueur effective:	230 mm.
Porte à faux:	15 mm.
Angle d'erreur de piste:	En deçà de 2°32' (au sillon extérieur d'und isque de 30 cm.) En deçà de 0°32' (au sillon intérieur d'un disque de 30 cm.)
Angle de décalage:	22°.
Frottement:	Moins de 7 mg (horizontal et vertical).
Masse réelle:	13 g (sans la cellule pick-up).
Plage de réglage de la pression d'appui:	0 – 3 g (type à lecture directe de la pression d'appui de la pointe).
Gamme de poids de la cellule pick-up utilisable:	5,5 – 8,5 g. 14,5 – 17,5 g (y compris la coque porte-cellule).
Poids de la coquille porte-cellule:	9 g.

Cellule pick-up

(pour appareil avec cellule pick-up)

No. du modèle:	EPC-270C-X.
Type:	Aimant mobile.
Réponse en frèquence:	20 Hz à 25 kHz −3 dB. 20 Hz à 15 kHz ±2 dB.
Tension de sortie:	3,2 mV à 1 kHz. 5 cm/sec., zéro à vitesse latérale de crête. 6,4 mV à 1 kHz, 10 cm/sec., zéro à vitesse latérale de créte (DIN 45500).
Séparation de canal:	25 dB à 1 kHz.
Equilibrage des canaux:	En deçá de 2 dB à 1 kHz.
Elasticite (dynamique)	10×10^{-6} cm/dyne à 100 Hz. (CBS STR-100).
Pression de la pointe de lecture:	1,75 ±0,25 gramme (17,5 ±2,5 mN).
Impédance de charge:	47 kΩ to 100 kΩ.
Poids:	6,0 grammes (cellule seule).
Pointe de lecture de remplacement:	EPS-270ED.

■ PARTS IDENTIFICATION

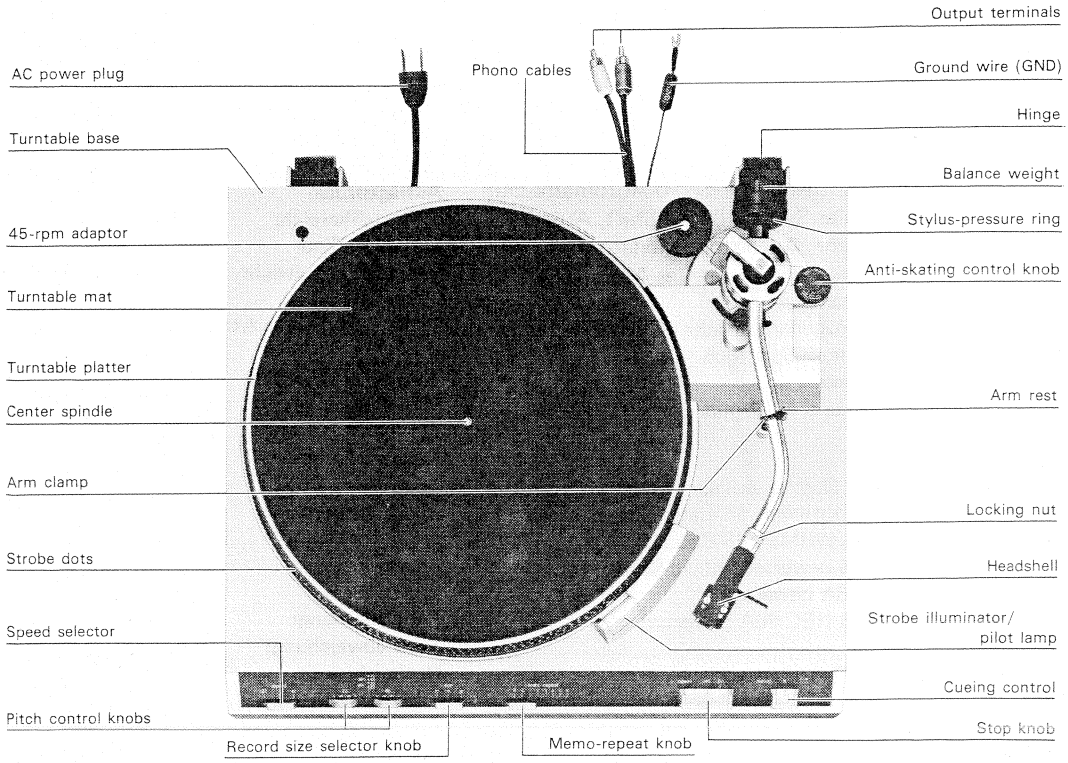


Fig. 1

■ FEATURES

New Type Frequency Generator Servo Control

One of the major secrets behind the razor-sharp accuracy and superb quality of sound lies in the new type (Frequency Generator) servo controlled DC motor, and greatly improved highly rellable IC circuitry. Even the slightest hint of speed change and drift is corrected immediately.

Electronic Speed Switching

Even though this turntable is belt-driven, gone is the old conventional pulley type speed changing mechanism. Speed switching in this unit is fully electronic, thereby adding to the high degree of mechanical precision and reliability.

All Front-Panel Controls

The advancement to complete front-panel control marks a big step forward in turntable operation, not only because of the greater convenience, but also because of the greater protection from dust, as the dust cover can stay closed.

Tonearm Cueing Controlled from Front Panel

The tonearm is raised and lowered softly by a viscous-damped cueing lifter. Even with the dust cover closed, a cueing can be easily performed as the control is located on the front panel.

Fully-Automatic Operation

All operations in the SL-230 are completely automatic, yet mechanical movements are accurate and silent. Full protection to records and stylus tip is assured. With the memo-repeat feature, favorite records may be repeated up to six times, or indefinitely.

Highly Sensitive Gimbal Suspension System

With the high-precision pivot bearings employed for the horizontal and vertical journals of the tonearm, in concert with the adoption of the gimbal suspension system, a high-sensitivity arm of less than 7 mg friction has been attained, thus making it possible to fully realize the performance of high-compliance cartridges.

Independent Pitch Controls

Permits record speed (at both 33-1/3 and 45 rpm) to be varied by up to 6%.

Precision Strobe Illuminator/Pilot Lamp

With the built-in strobe illuminator/pilot lamp, accurate speed adjustments can be made rapidly and easily.

Anti-Skating Force Mechanism

The well-designed anti-skating force mechanism ensures minimum side thrust with different cartridges and guarantees accurate center-of-the-groove tracking.

Detachable Dust Cover

HOW TO OPERATE

Manual play

Place a record on the turntable mat.
Set the speed selector to the desired record speed. (See Fig. 2.)

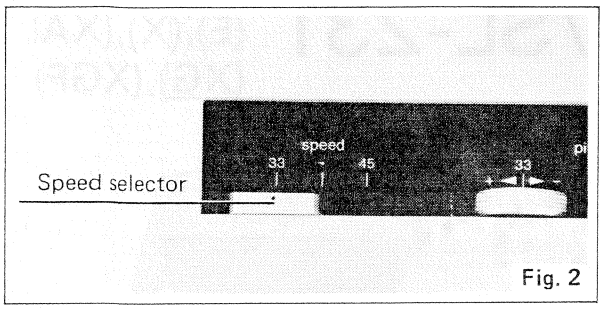


Fig. 2

Remove the stylus protector, if you cartridge has a detachable one.
Release the arm clamp.
Set the cueing control to the "▼" position. (See Fig. 3.)
Move the tonearm over the desired groove.
When you move the tonearm towards the center spindle, the turntable platter will rotate.
Move the cueing control to the "▼" position. (See Fig. 4.)
The tonearm will descend slowly onto the record and play will begin.

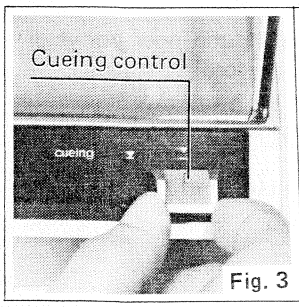


Fig. 3

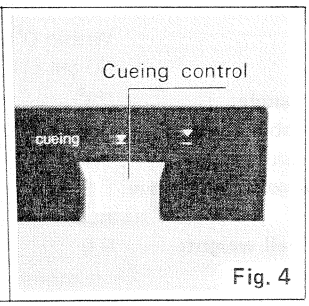


Fig. 4

When play has finished, the tonearm will automatically return to the arm rest (auto-return) and the turntable platter will stop rotation.
(The turntable platter will continue to rotate briefly due to its own inertia.)
Note:

- If the "memo-repeat" knob is in a position other than "0", play will be repeated by the number of times set; therefore, be sure to keep the "memo-repeat" knob in the "0" position.
- After play is completed, fasten the tonearm with the arm clamp and set the speed selector to the "•" position.
- Attach the stylus protector again, if you have one, to protect the stylus tip from damage.

When you play a 45-rpm record with a large center hole

Place the 45-rpm adaptor on the center spindle.
Set the speed selector to the "45" position.

How to suspend play

Move the cueing control to the "▼" position.
The stylus tip of the cartridge will be lifted from the record.

How to stop play

Move the start/stop knob to the "stop" position. **(See Fig. 5.)** The tonearm will automatically return to the arm rest and the turntable will stop rotating.
Note:

- If the "memo-repeat" knob is in a position other than "0", play will be repeated by the number of times set; therefore, be sure to keep the "memo-repeat" knob in the "0" position.

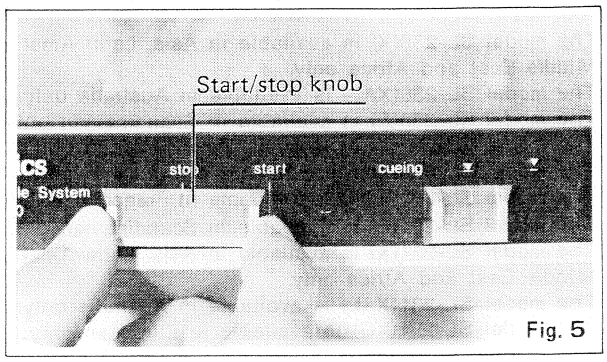


Fig. 5

Automatic play

Set the speed selector in the same manner as in manual play and release the arm clamp.
Set the record size selector to the diameter of the record (7" (17 cm), 10" (25 cm) or 12" (30 cm)) you wish to play. (See Fig. 6.)
Note:

- Care should be taken not to move the record size selector when the tonearm is moving in the automatic start or automatic return cycle.

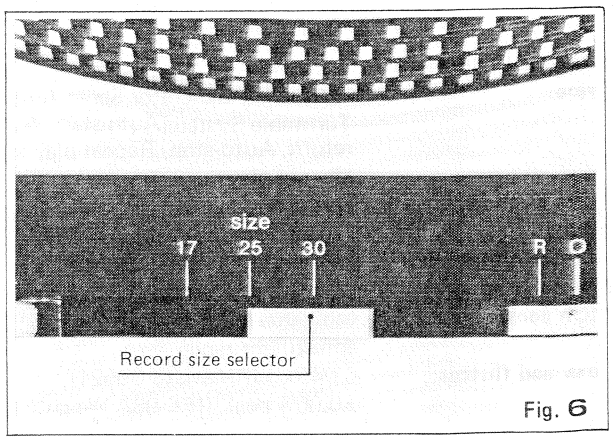


Fig. 6

Move the start/stop knob to the "start" position.
The tonearm will move automatically over the lead-in groove and descend slowly to the record (auto-start). Play will begin.
Note:

- In this case, the "start/stop" knob will automatically return to the neutral position after play has begun.

When play has finished, the tonearm will automatically return to the arm rest (auto-return) and the turntable platter will stop rotation.
(The turntable platter will continue to rotate briefly due to its own inertia.)
Note:

- If the "memo-repeat" knob is in a position other than "0", play will be repeated by the number of times

set; therefore, be sure to keep the "memo-repeat" knob in the "0" position.
- After play is completed, fasten the tonearm with the arm clamp and set the speed selector to the "•". position.
- Attach the stylus protector again, if you have one, to protect the stylus tip from damage.
- Records having sizes other than 17 cm, 25 cm and 30 cm (7", 10" and 12") should be played manually. Your turntable is designed for automatic handling of records that adhere to accepted industry dimensions. Therefore, use the unit manually for records other than standard sizes.

Repeat play

Set the speed selector and record size selector in the same manner as in automatic play.
Set the "memo-repeat" knob to the desired number of times you wish to play. (See Fig. 7.)
"R" position enables you to repeat play continuously.
Subsequently, follow the same procedures as for the automatic (auto-start) play.

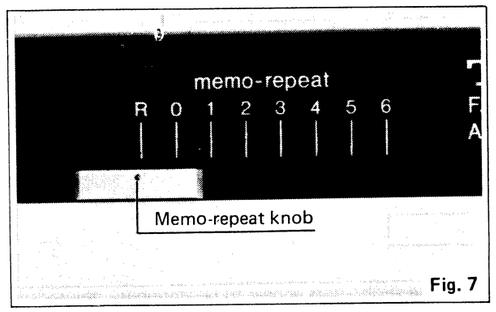


Fig. 7

Note:
- The "memo-repeat" knob may be moved either left or right without any inconvenience, but care should be taken not to move it when the tonearm is moving in the automatic start or automatic return cycle.

■ ADJUSTMENTS

Adjustment of the anti-skating control

Set the anti-skating control knob to the same value as the stylus pressure. **(See Fig. 8.)**
Note:
- When a cartridge with integral dust brush is used, follow the cartridge manufacturer's recommendation for adjusting both stylus pressure and anti-skating force.

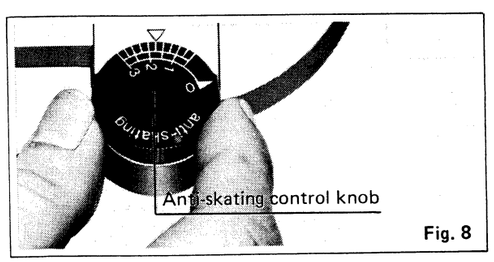


Fig. 8

Adjustment of arm-lift height (See Figs. 9 and 10.)

- The arm-lift height distance between the stylus tip and record surface when cueing control is at "▼" has been adjusted at the factory before shipping to approximately 5 to 10 mm.
- For using different cartridges available on the market or when further adjustments are particularly necessary, make adjustment as follows:

1. Put on the stylus protector to protect the stylus tip from damage.
2. Set the speed selector to the "•" position to prevent the turntable platter from rotation.
3. Move the tonearm towards the center spindle.
4. Turn the adjustment screw clockwise or counterclockwise, while pushing the arm lift down. **(See Fig. 10.)**

Clockwise rotation
– distance between the recrod and stylus tip is reduced.
Counterclockwise rotation
– distance between the record and stylus tip is increased.

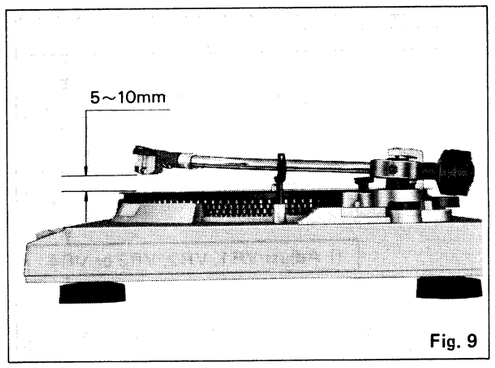


Fig. 9

Note:
- As the adjusting screw has a hexagonal head, be sure to make the adjustment while depressing the arm lift, or the screw will not move freely. Also be sure that the hexagonal head retracts correctly into the arm lift when the latter is released.

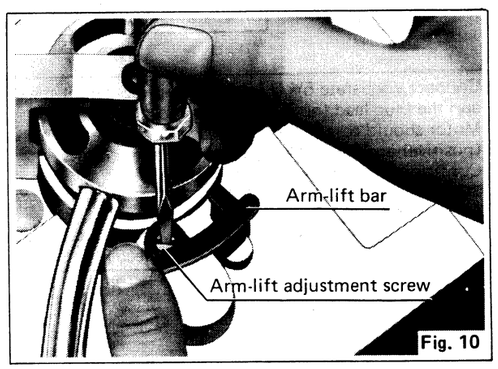


Fig. 10

Speed adjustment (with pitch control knobs) (See Fig. 11.)

Strobe dots are set on the rim of the turntable platter according to the power-time frequency and the number of revolutions of the records. Make adjustment, referring to strobe dot indication. **(See Fig. 11.)**
1. Place a record on the turntable mat.
2. Set the speed selector to the speed to be adjusted.
3. Adjust the speed while playing a record.
   The strobe-illuminator/pilot lamp will be lit for illuminating the strobe dots.
   While turning the pitch control knobs either to "+" side or "–" side, adjust so that the strobe dots of the turntable platter look as if they were stationary. The state under which the strobe dots seem to be stationary represents the correct number of revolutions.

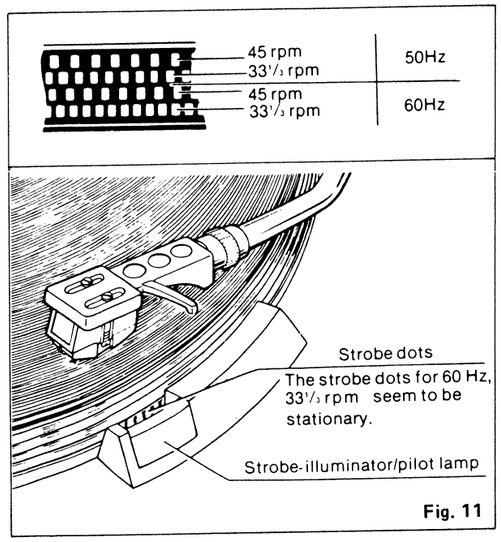


Fig. 11

"+" direction
This increases the speed of the turntable rotation, and the strobe dot pattern seems to flow in the same direction as the rotational direction of the turntable platter.
"–" direction
This decreases the speed of the turntable rotation, resulting in a state opposite to that in the "+" direction.

Note:
Strobe dot pattern
The strobe-illuminator/pilot lamp of this unit employes the commercially available power source. The frequency of such power source, when actually measured, has a fluctuation of about 2%. As such a fluctuation of the power source affects the strob-illuminator, the strobe dot pattern also seems to fluctuate to a certain extent. But the unit is not affected by these fluctuations of the power source, since a DC motor is employed. In other words rotation of the platter will be constant, and slight shifts in the movement of the dots simply reflect normal drift in the power-source frequency.

Speed adjustment (with VR3, 4 on the Motor P.C.B.) 33 r.p.m. 45 r.p.m.

E – ⟲ +– ⟲ + **Bottom side**

"+" direction
This increases the speed of the turntable rotation.
"–" direction
This decreases the speed of the turntable rotation.

Adjustment for automatic start and return positions (See Fig. 12.)

Should the tonearm out function correctly, make adjustments according to the following procedures.

Adjustment for automatic start position (Remove the rubber cap.)
In cases where the stylus tip descends outside of the record
–Rotate clockwise
In cases where the stylus tip descends onto halfway of a recroded piece
–Rotate counterclockwise.

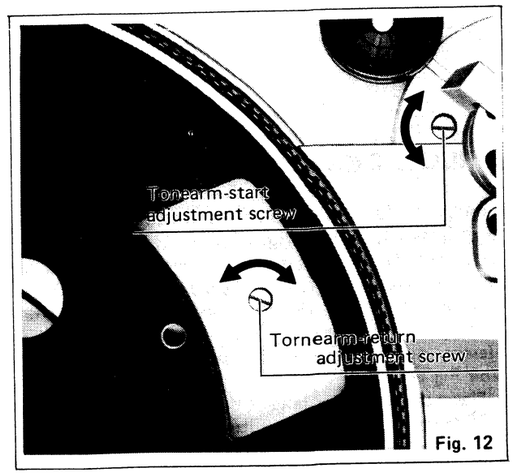


Fig. 12

Adjustment for automatic return position (Remove turntable mat.)
In cases where the tonearm tends to return before the playing has finished
– Rotate clockwise.
In cases where the tonearm fails to return after the last groove of the record
– Rotate counterclockwise.

■ JUSTIERUNGEN

Geschwindigkeits-Feineinstellung (mittels der Feineinsteller) (Vgl. Abb. 11.)

Die Stroboskoppunkte sind auf dem Plattentellerrand entsprechend der Stromfrequenz und der Drehzahl der Schallplatten angebracht. Richten Sie sich bei der Drehzahl-Feineinstellung nach dem Stroboskopbild. **(Vgl. Abb. 11.)**

1. Legen Sie eine Schallplatte auf den Plattenteller.
2. Stellen Sie den Geschwindigkeitsumschalter auf die zu regulierende Geschwindigkeit ein.
3. Regulieren Sie die Geschwindigkeit während dem Abspielen de Platte.
   Die Stroboskoplampe/Einschaltkontrollampe leuchtet zur Beleuchtung der Stroboskoppunkte.
4. Regulieren Sie durch Drehen der Einstellknöpfe in "+" oder "–" Richtung, solange, bis die Stroboskoppunkte den Anschein vermitteln, daß sie stillstehen.
   Der Zustand, in dem die Stroboskoppunkte scheinbar stationar verbleiben, stellt die korrekte Drehgeschwindigkeit dar.

"+" Richtung

Die Drehgeschwindigkeit des Plattentellers erhöht sich, und die Stroboskoppunkte scheinen in der gleichen Richtung zu laufen, wie der Plattenteller.

"–" Richtung

Die Drehgeschwindigkeit des Plattentellers verringert sich, und die Stroboskoppunkte laufen in der, der Drehrichtung des Plattentellers entgegengesetzten Richtung.

Anmerkung:

Stroboskoppunktemuster

Die Stroboskoplampe/Kontrollampe dieses Gerätes arbeitet mit normalem Netzstrom. Die Frequenz dieser Stromquelle besitzt einen Schwankungsbereich von 0,2%. Da eine solche Schwankung der Stromquelle die Stroboskoplampe beeinflußt, scheint das Punktemuster auch zu einem gewissen Grad zu fließen. Die Drehzahl des Plattentellers wird jedoch durch diese Schwankung nicht beeinflußt, da ein Gleichstrommotor den Plattenteller antreibt.
Anders ausgedrückt, die Umdrehungsgeschwindigkeit des Plattentellers bleibt konstant, und die geringfügige Bewegung des Stroboskoppunktemusters entspricht lediglich der normalen Schwankung der Netzfrequenz.

■ REGLAGES

Réglage de la vitesse (avec les boutons de réglage de précision). (Voir Fig. 11.)

Les points du stroboscope se trouvent disposés sur le bord du plateau du tourne-disque en fonction de la fréquence de durée de puissance et du nombre de révolutions des disques. Effectuer le mise au point, en se réferant aux indications des points stroboscopiques, (Voir Fig.11).

1. Placer un disque sur le tapis du plateau de lecture.
2. Disposer le sélecteur de vitesse sur la vitesse devant être mise au point.
3. Régler la vitesse tout en faisant jouer un disque.
   La lampe-témoin/éclairage du stroboscope s'allumera pour éclairer les points stroboscopiques.
4. Il faut tourner les boutons de réglage de précision suffisamment, soit dans le sens "+" soit dans le sens "–", pour que les points du stroboscope du plateau de lecture paraissent stationnaires.
   L'état dans lequel les points du stroboscope paraissent immobiles représente le nombre correct de révolutions.

Senss "+"

Ce sens accroît la vitesse de rotation du plateau et les points du stroboscope semblent se déplacer dans le sens de rotation du plateau.

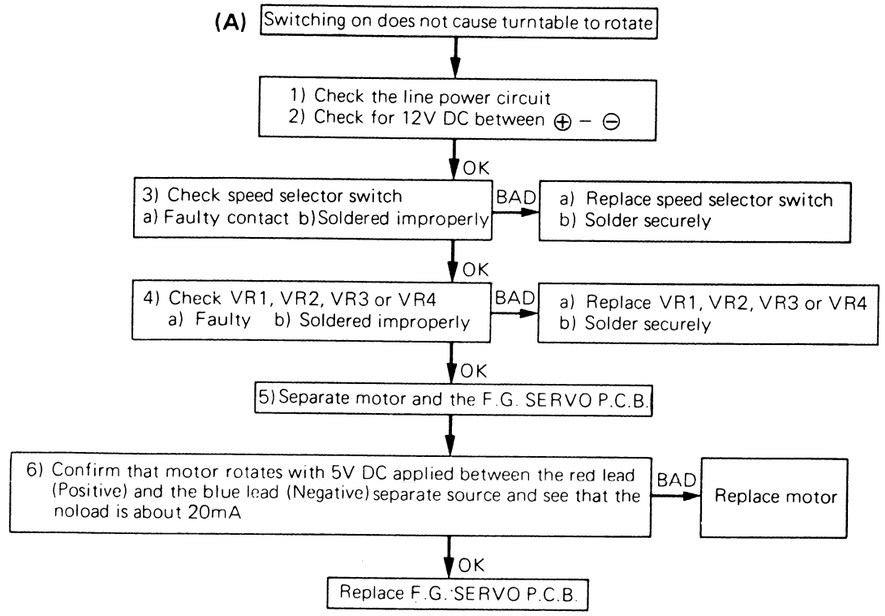
Sens "–"

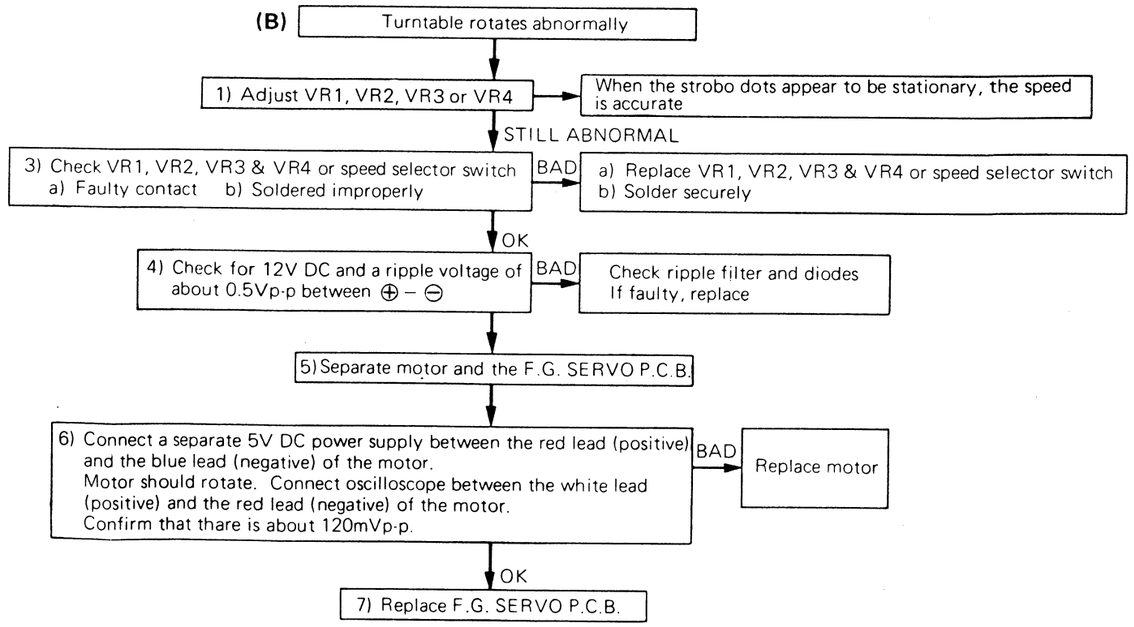
Ce sens diminue la vitesse de rotation du plateau, son effet est contraire à celui du sens "+".

Nota:

Imdge des points stroboscopiques
La lampe témoin/éclairage du stroboscope de cet apparil utilise une alimentation disponible commercialement.
S'il se produit une vibration de la fréquence du courant d'alimentation de l'appareil, il se peut que l'on observe un l'eger déplacement des points du stroboscope.
Bien que le courant du secteur soit en général très stable en ce qui concerne la fréquence, si l'on procède à des mesures précises sur une durée suffisamment longue, il est possible, d'observer une variation qui, en moyenne, est de l'ordre de 0,2%. Ce sont ces variations qui provoquent le déplacement des points du stroboscope. Mais l'appareil n'est pas affecté par ces variations, étant donné qu'un moteur à conrant continu est utilisé. En d'autres mots, la rotation du plateau restera constante, et les légères variations dans le mouvement des points ne reflètent simplement qu'une déviation normale dans la fréquence de la source d'énergie.

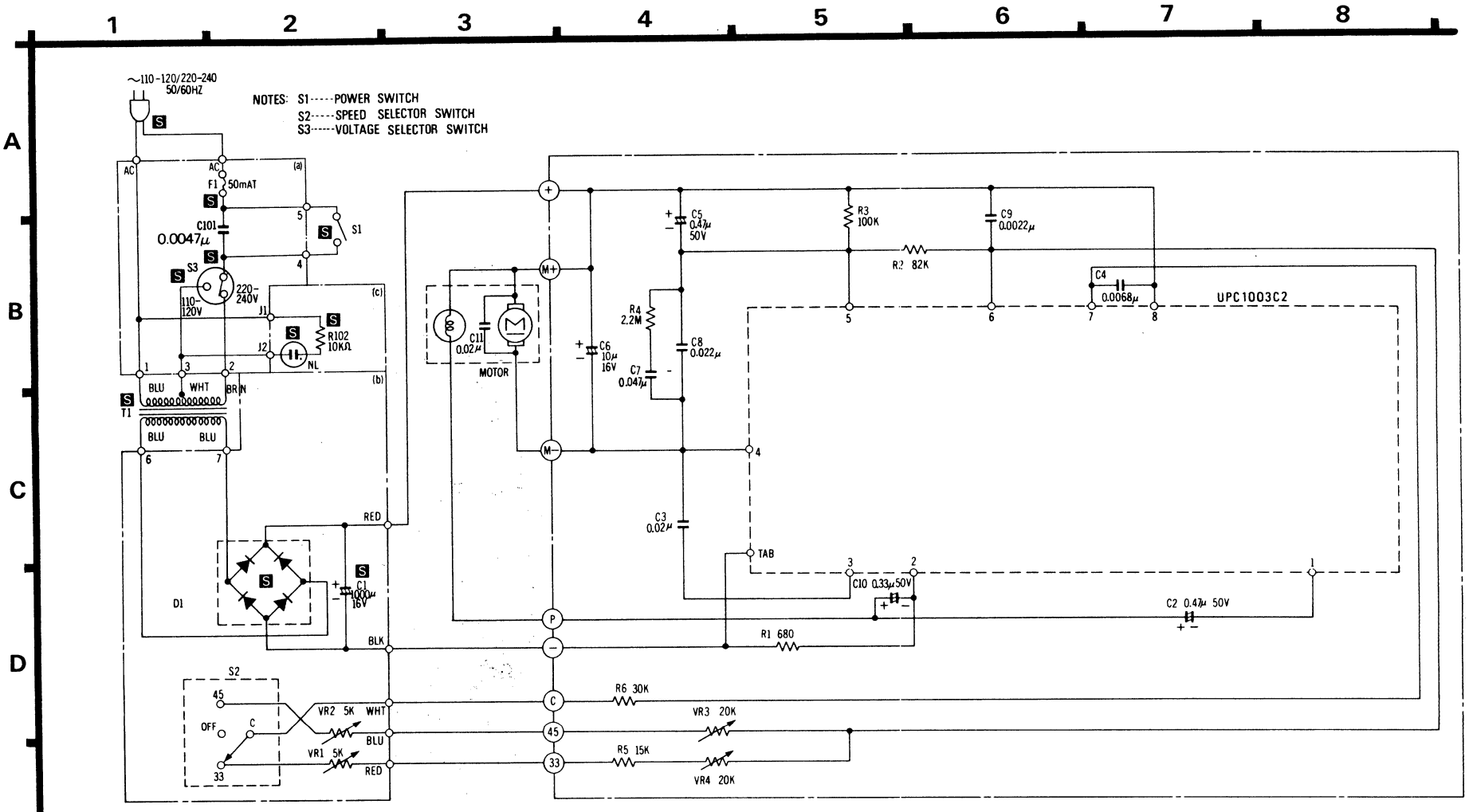
■ CHECK POINTS


(A)
Switching on does not cause turntable to rotate
1) Check the line power circuit
2) Check for 12V DC between ⊕ – ⊖
OK
3) Check speed selector switch
a) Faulty contact b)Soldered improperly
BAD
a) Replace speed selector switch
b) Solder securely
OK
4) Check VR1, VR2, VR3 or VR4
a) Faulty b) Soldered improperly
BAD
a) Replace VR1, VR2, VR3 or VR4
b) Solder securely
OK
5) Separate motor and the F.G. SERVO P.C.B.
6) Confirm that motor rotates with 5V DC applied between the red lead (Positive) and the blue lead (Negative) separate source and see that the noload is about 20mA
BAD
Replace motor
OK
Replace F.G. SERVO P.C.B.


(B)
Turntable rotates abnormally
1) Adjust VR1, VR2, VR3 or VR4
When the strobo dots appear to be stationary, the speed is accurate
STILL ABNORMAL
3) Check VR1, VR2, VR3 & VR4 or speed selector switch
a) Faulty contact b) Soldered improperly
BAD
a) Replace VR1, VR2, VR3 & VR4 or speed selector switch
b) Solder securely
OK
4) Check for 12V DC and a ripple voltage of about 0.5Vp-p between ⊕ – ⊖
BAD
Check ripple filter and diodes
If faulty, replace
5) Separate motor and the F.G. SERVO P.C.B.
6) Connect a separate 5V DC power supply between the red lead (positive) and the blue lead (negative) of the motor.
Motor should rotate. Connect oscilloscope between the white lead (positive) and the red lead (negative) of the motor.
Confirm that thare is about 120mVp-p.
BAD
Replace motor
OK
7) Replace F.G. SERVO P.C.B.

■ SCHEMATIC DIAGRAM

This schematic diagram may be modified at any time with the development of new technology.



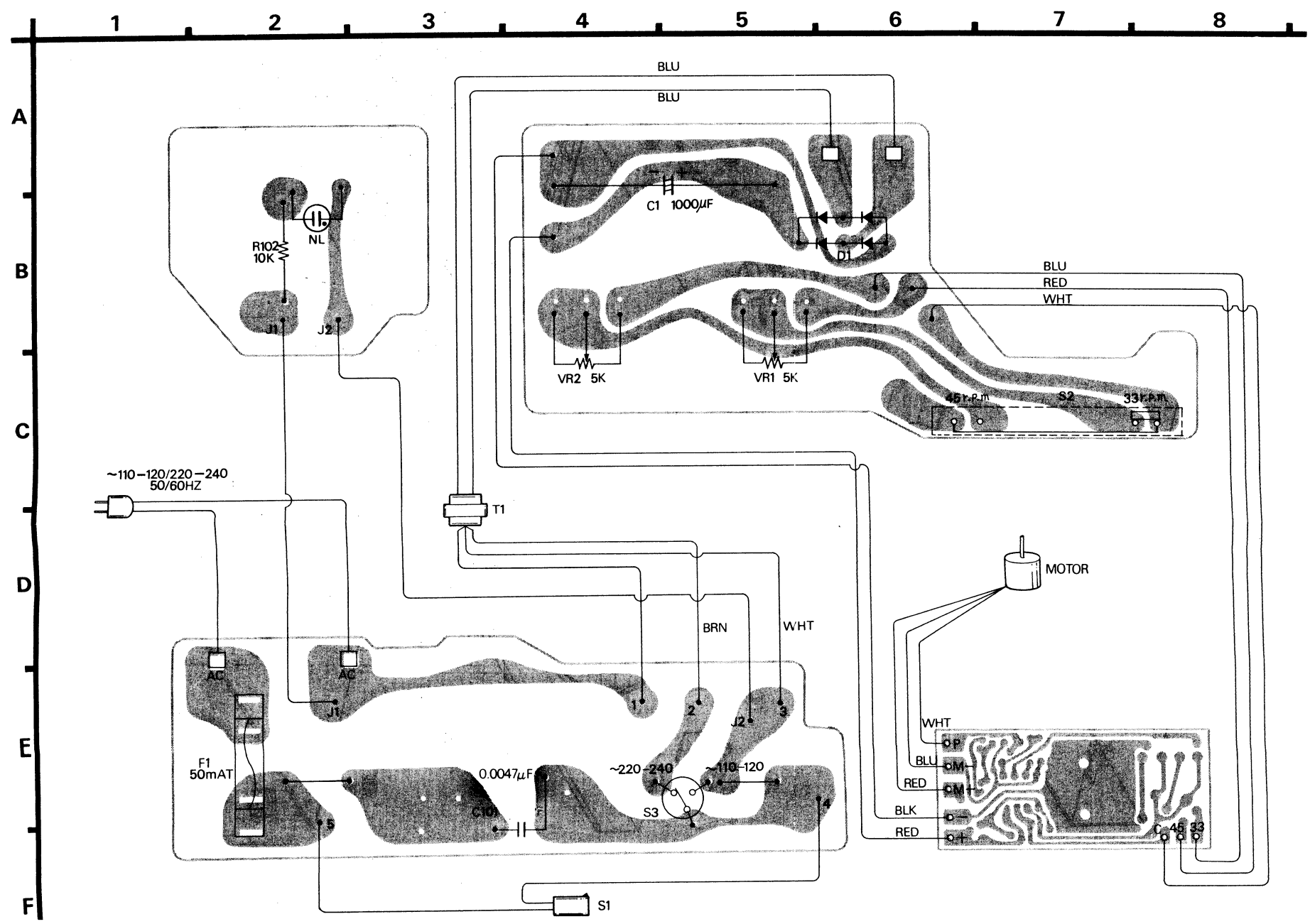
NOTES; 1. Part numbers are indicated on most mechanical parts. Please use this part number for parts orders.
2. Guide letters of Resistor and Capacitor indicate;
Resistor: ERG . . . Metal oxide
Capacitor: ECEB . . . Electrolytic; ECKD . . . Ceramic; ECQE . . . Polyster
3. ■ indicates that only parts specified by the manufacturer be used for safety.
4. SL-230 (X) ⟶ (X) SL-230 (XAL) ⟶ (XAL)
SL-230 (XG) ⟶ (XG) SL-230 (XGE) ⟶ (XGE)
SL-230 (XGF) ⟶ (XGF) SL-230 (E) ⟶ (E)

Ref. No.		Part No.
DIODE		
D1	S	SVDS1RBA20
TRANSFORMER		
T1	S	SLTMPT-033A
CAPACITORS		
C1	S	**ECEB1CS102**
C101(X,XG,XGF)	S	ECQE2A472MZ
C101(XAL,XGE,E)	S	ECKDHS472MD

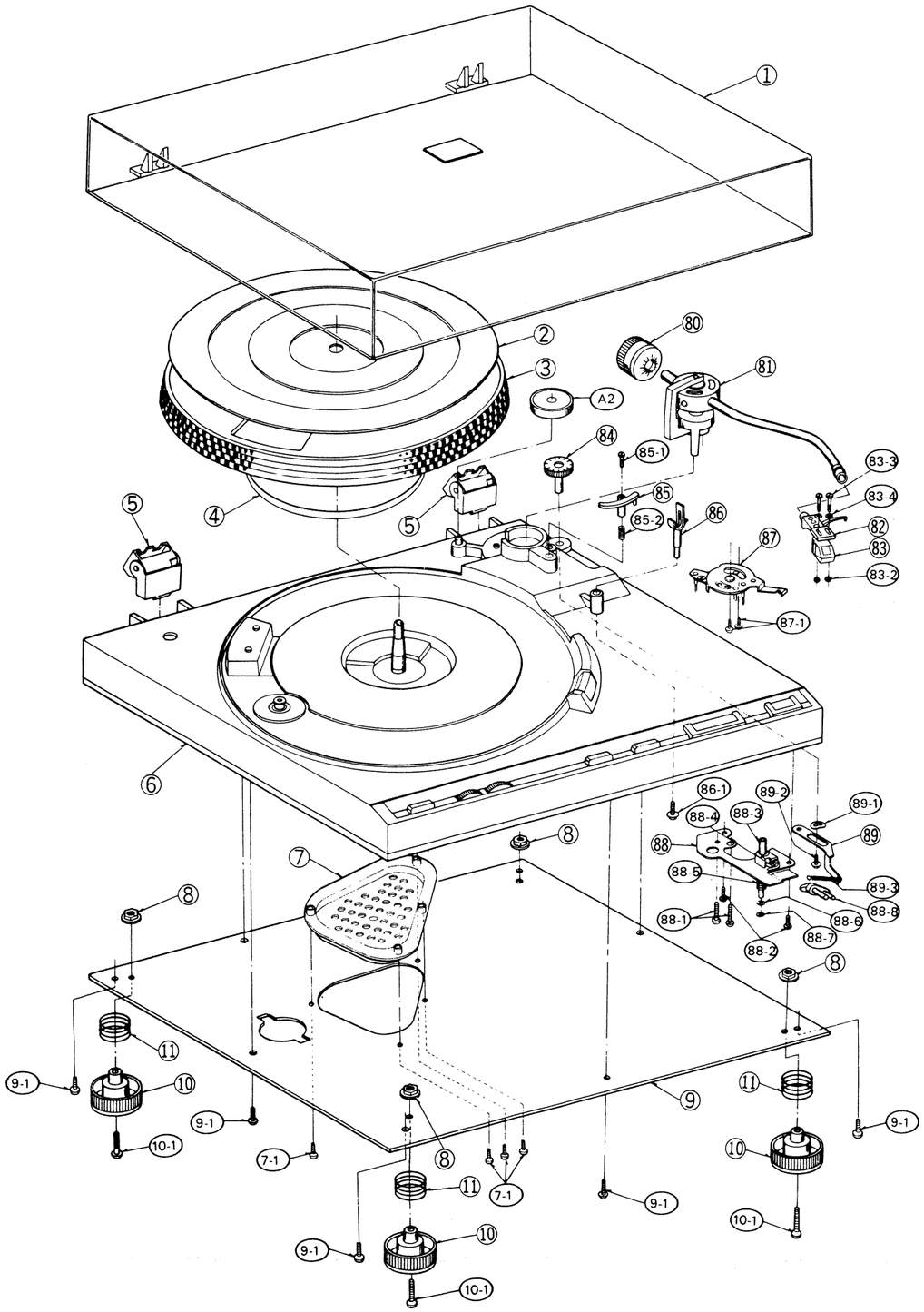
Ref. No.		Part No.
RESISTOR		
R102	■	**ERG1ANJ103**
VARIABLE RESISTOR		
VR1, 2		EVHX8AF15B53
VR3, 4		EVN31AA00B24
LAMP		
NL	■	SFDNE2HU

Ref. No.		Part No.
SWITCHES		
S1 (X,XG,XGF)	S	SFDSAH764039
S1 (XAL,XGE,E)	S	V-1A445
S2		EVAH25SBBAAF
S3	S	SFDSHXW13312
FUSE		
F1	■	XBA2C005TRO

■ CIRCUIT BOARD WIRING VIEW



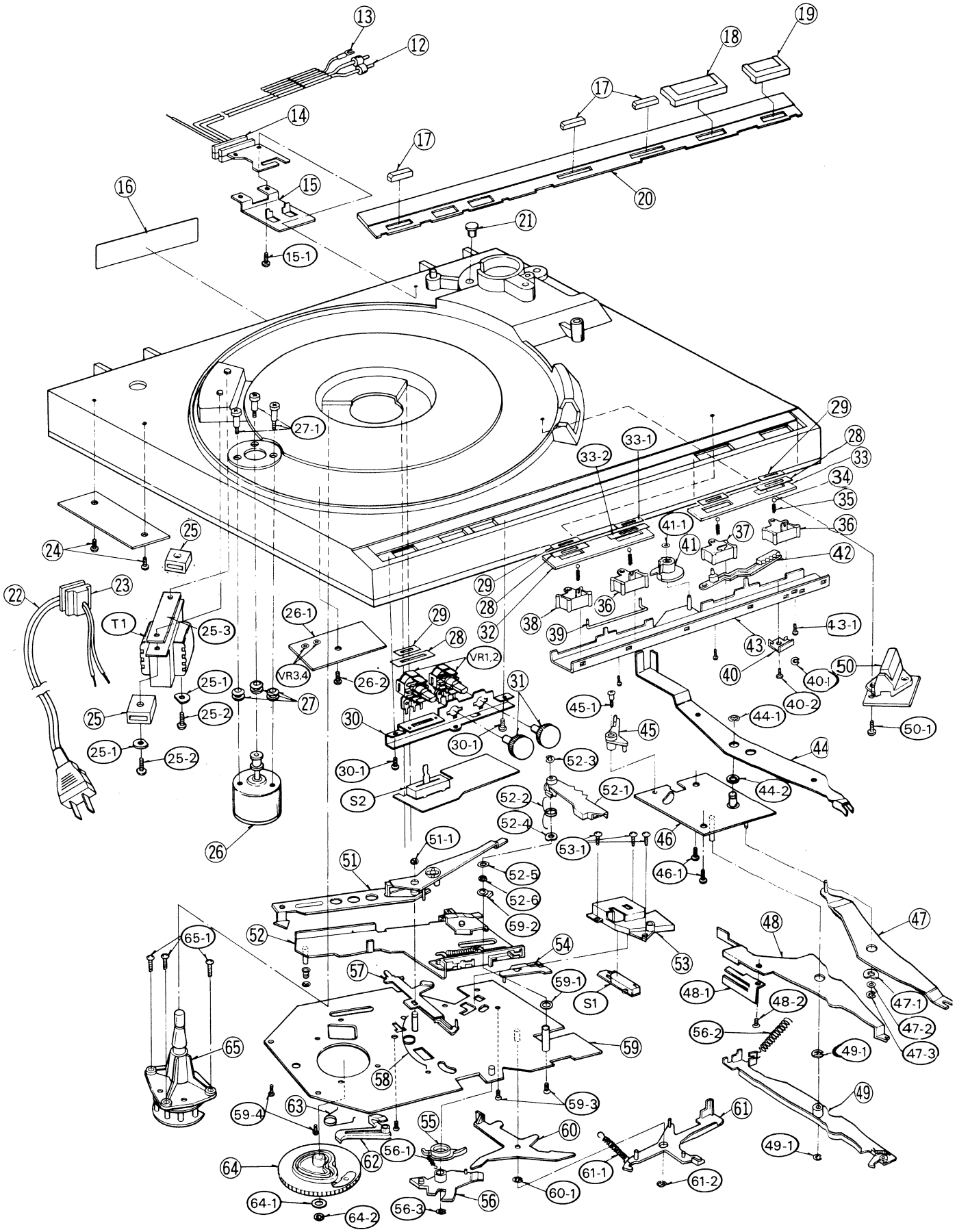
■ EXPLODED VIEWS



■ REPLACEMENT PARTS LIST

NOTES: 1. Part numbers are indicated on most mechanical parts. Please use this part number for parts orders.
2. S indicates that only parts specified by the manufacturer be used for safety.
3. SL-230(X) → (X) SL-230(XAL) → (XAL)
SL-230(XG) → (XG) SL-230(XGE) → (XGE)
SL-230(XGF) → (XGF) SL-230(E) → (E)

Ref. No.		Part No.	Part Name & Description
CABINET and CHASSIS PARTS			
1		SFAD350-01E	Dust Cover
2		SFTG301-01	Turntable Mat
3		SFTE301-01	Turntable
4		SFGB321-1	Belt
5		SFAT301-01A	Hinge Ass'y
6		SFAC212-01	Cabinet
7		SFUM222-20	Cover, Gear
7-1		XTCS3+16GFZ	Screw, Gear Cover
8		SFXN212-01	Nut, Insulator
9		SFAU222X01	Bottom Board
9-1		XTCS3+16GFYR	Screw, Bottom Board
10		SFGA212-01	Insulator
10-1		XSN3+14S	Screw, Insulator
11		SFQC212-01	Spring, Insulator
12		SFDH212-01	Phono Cord Ass'y
13		SFEL028-01E	Ground Wire
14		SFUM212-08	Clamper, Phono Cord
15		SFUP212-12	Plate, Shield
15-1		XTV3+10G	Screw, Shield Plate
16 (X,XG,XGF)		SFNN230X01	Name Plate
16 (XAL,XGE)		SFNN230G01	Name Plate
16 (E)		SFNN230S01	Name Plate
17		SFKT212-01	Knob, Speed, Repeat and, Size
18		SFKT212-03	Knob, Operating
19		SFKT212-04	Knob, Cueing
20		SFKK230-01	Panel
21 (X,XAL,E,XGE)		SFGK170-01	Cap, Rubber
21 (XG,XGF)		SFGK171F01	Cap, Rubber
22 (X,XG,XGF,E)	S	RJA23ZC	AC Cord
22 (XAL)	S	QFC12O7M	AC Cord
22 (XGE)	S	RJA45ZC	AC Cord
23 (Except XAL)		SFUM190-11	Bushing, AC Cord
23 (XAL only)		SFUM190-12	Bushing, AC Cord
24		XTV3+10G	Screw, P.C.B.
25		SFGC212-03	Rubber, Power Transformer
25-1		XWT3	Washer, Power Transformer
25-2		XTV3+10G	Screw, Power Transformer
25-3		SFUP212X01	Plate, Shield, Power Transformer
26		SFMH212-01R	Motor W/Capstan
26-1		FEEGA595	P.C.B. Ass'y, Motor
26-2		XTV3+10G	Screw, Motor P.C.B. Ass'y
27		SFGC020L01	Rubber, Motor
27-1		SFXG023L01	Screw, Motor
28		SFUP212-13	Shutter A
29		SFUP212-07	Shutter B
30		SFUP212-11	Plate, Speed Adjustment
30-1		XTV3+10G	Screw, Speed Adjustment
31		SFKT212-02	Knob, Speed Adjustment
32		SFUM212-02	Plate, Operation
33		SFUM230-02	Plate, Repeat
33-1		SFUP230-01	Shutter A, Repeat
33-2		SFUP230-02	Shutter B, Repeat
34		SFYB5-32	Ball, Slider Ass'y
35		SFQA130-11	Spring, Slider Ass'y
36		SFUM212-03E	Slider Ass'y, A
37		SFUP212-20E	Slider Ass'y, B
38		SFUM230-01E	Select Slider Ass'y
39		SFQS230-01	Select Lod
40		SFUP230-05	Bracket, Select Lod
40-1		SFGZ230-01	Rubber, Select Lod Bracket
40-2		XTN3+10J	Screw, Select Lod Bracket
41		SFUM230-04	Cam, Repeat
41-1		**XUC3FT**	Circlip, Repeat Cam
42		SFUM230-03E	Repeat Ass'y
43		SFUK230-01E	Operation Support Ass'y
43-1		XTV3+20G	Screw, Operation Support Ass'y
44		SFUP212-04	Lever, Cueing
44-1		**XUC5FT**	Circlip, Cueing Lever
44-2		SFXW190-22	Washer, Cueing Lever
45		SFUM230-07	Lever, Stop
45-1		SFPJK15002	Screw, Stop Lever
46		SFUK230-02E	Plate, Cueing Lever
46-1		XTV3+10G	Screw, Cueing Lever Plate
47		SFUP230-04E	Select Lever Ass'y
47-1		SFXW910-08	Washer, Select Lever Ass'y
47-2		XWE4G10	Washer, Select Lever Ass'y
47-3		**XUC3FT**	Circlip, Select Lever Ass'y
48		SFUP222-01	Lever, Start
48-1		SFQP230-01	Support, Start Lever
48-2		XTN3+5J	Screw, Start Lever Spring
49		SFUP230-03A	Searching Lever Ass'y
49-1		**XUC3FT**	Circlip, Searching Lever
50		SFUM212-07	Cover, Neon
50-1		XTV3+10G	Screw, Neon Cover
51		SFUC222-11E	Actuating Plate Ass'y
51-1		**XUC3FT**	Circlip, Actuating Plate Ass'y
52		SFUB230-11A	Operating Plate Ass'y
52-1		SFUM230-12	Index Plate
52-2		SFQS230-11	Spring, Index Plate
52-3		**XUC5FT**	Circlip, Index Plate
52-4		SFXW831-5	Washer, Index Plate
52-5		SFXW230-11	Washer, Index Plate
52-6		**XUC5FT**	Circlip, Index Plate
53		SFUM222-14	Cover, Switch
53-1		XTN3+8J	Screw, switch Cover
54		SFUM222-15	Plate, Switch
55		SFUM230-14	Support Pin, Switch
56		SFUM230-13	Support, Switch
56-1		SFQH130-14	Spring, Switch Support
56-2		SFQH230-01	Spring, Searching Lever
56-3		**XUC3FT**	Circlip, Switch Support
57		SFUM222-13	Plate, Stop
58		SFQS222-12	Spring, Stop Plate
59		SFUK222-11E	Automatic Mechanism Ass'y
59-1		SFXW623-02	Washer, Automatic Mechanism Ass'y
59-2		SFXW130-13	Washer, Automatic Mechanism Ass'y
59-3		XTV3+35G	Screw, Automatic Mechanism Ass'y
59-4		XTV3+10G	Screw, Automatic Mechanism Ass'y
60		SFUM222-16	Lever, Switch
60-1		**XUC3FT**	Circrip, Plate
61		SFUM230-11	Plate
61-1		SFQH910-11	Spring, Plate
61-2		**XUC3FT**	Circrip, Plate
62		SFUM222-11	Support, Gear Setting
63		SFQS222-11	Spring, Support
64		SFUG190-22E	Main Gear Ass'y
64-1		SFXW890B01	Washer, Main Gear Ass'y
64-2		**XUC5FT**	Circlip, Main Gear Ass'y
65		SFTU222-11E	Shaft, Turntable
65-1		XTN3+10J	Screw, Turntable Shaft
TONE ARM and ARM BASE			
80		SFPWG21001K	Balance Weight Ass'y
81		SFPAM21001K	Tone Arm Ass'y
82		SFPCC22101K	Head Shell
83		EPC270C2K-X	Cartridge
83-1		EPS270ED	Stylus
83-2		SFPEN3302	Nut, Cartridge
83-3		SFPEV22101	Screw, Cartridge
83-4		SFPEW9601	Washer, Cartridge
84		SFPJK19004	Knob, Anti-skate Force Control
85		SFPRT13003K	Lift Ass'y
85-1		SFXG829-1	Screw, Tone Arm Lift Adjustment
85-2		SFQA829-03	Spring, Lift Ass'y
86		SFKU212-01E	Arm Rest
86-1		XTW3+14GFZ	Screw, Arm Rest
87		SFUP222-02A	Tone Arm Fixing Plate Ass'y
87-1		SFPEV13204	Screw, Tone Arm Fixing Plate Ass'y
88		SFUP212-01E	Bracket, Lift Ass'y
88-1		XTN4+14J	Screw, Lift Ass'y Bracket
88-2		XTV3+10G	Screw, Lift Ass'y Bracket
88-3		SFXJ212-01E	Lift Bar Ass'y
88-4		SFPSP13102	Spring, Cueing
88-5		SFQA212-01	Spring, Lift Bar Ass'y
88-6		XWE3A7BW	Washer, Lift Bar Ass'y
88-7		**XUC2FT**	Circlip, Lift Bar Ass'y
88-8		SFUM212-01	Cam, Cueing
89		SFUP212-02	Plate, Anti-skate Force Control
89-1		SFXW831-5	Washer, Plate
89-2		XTW26+5E	Screw, Plate
89-3		SFPSP19004	Spring, Anti-skate Force Control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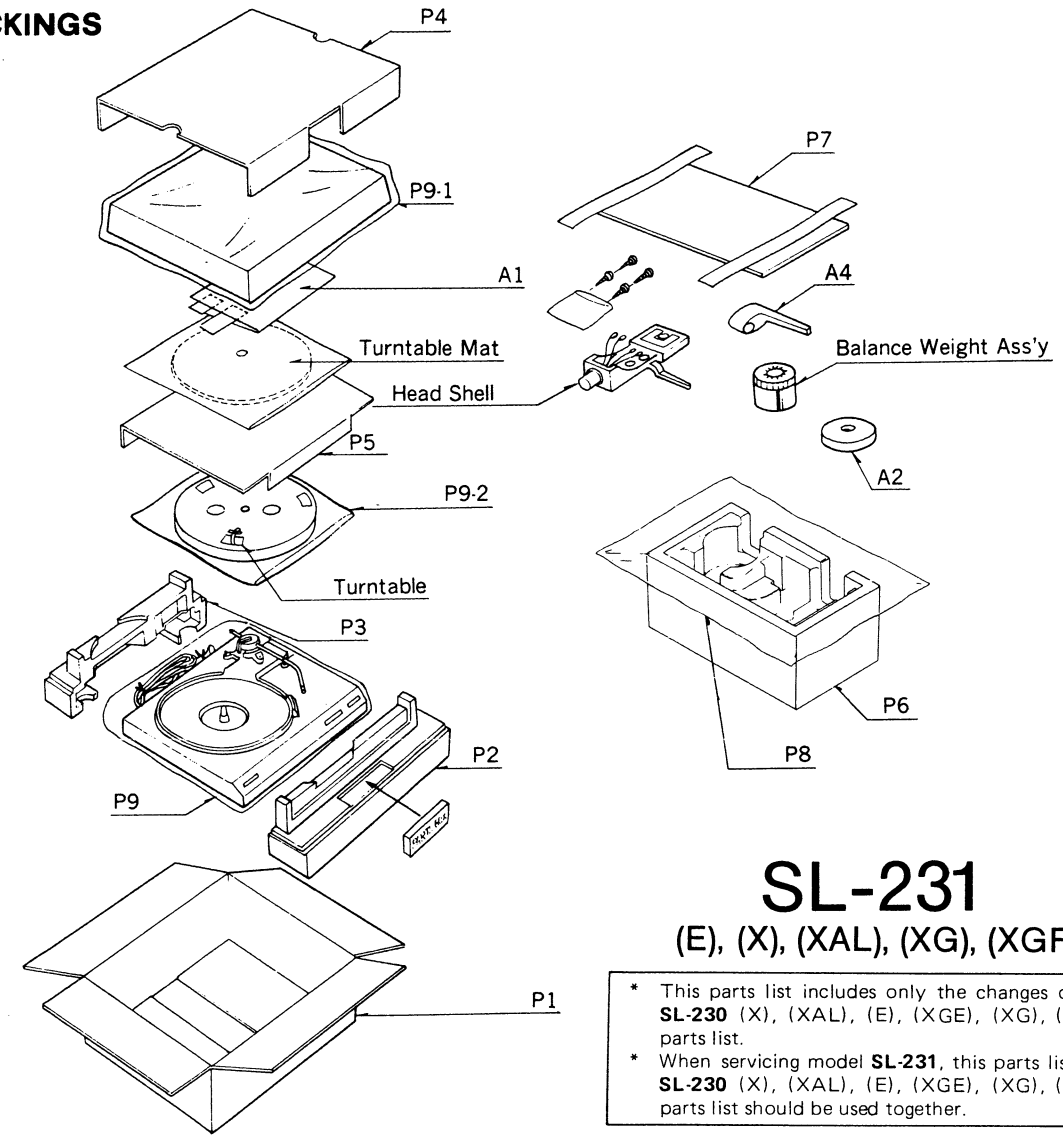
■ PACKINGS



SL-231

(E), (X), (XAL), (XG), (XGF)

* This parts list includes only the changes of the **SL-230** (X), (XAL), (E), (XGE), (XG), (XGF) parts list.
* When servicing model **SL-231**, this parts list and **SL-230** (X), (XAL), (E), (XGE), (XG), (XGF) parts list should be used together.

■ CHANGE OF PARTS FROM SL-230 (X, XAL, E, XGE, XG, XGF)

SL-231 (E)⟶(E)　SL-231 (XG)⟶(XG)
SL-231 (X)⟶(X)　SL-231 (XGF)⟶(XGF)
SL-231 (XAL)⟶(XAL)

Ref. No.		Part No.	Part Name & Description
CAPACITORS			
C101(X,XG,XGF) **C101**(XAL,E)		ECQE2A103MZ ECKDHS103SE	Polyester, 0.01 μF, 125V, ±20% Polyester, 0.01 μF, 400V, +50~−20%
SWITCHES			
S1(X,XG,XGF) **S1**(XAL,E)		SFDSAH764039 V-1A445	Switch, Power Switch, Power
CABINET and CHASSIS PARTS			
6		SFAC213P01	Cabinet
16(X,XG,XGF)		SFNN231P01	Name Plate
16(XAL)		SFNN231L01	Name Plate
16(E)		SFNN231S01	Name Plate
20		SFKK231P01	Panel
21		SFGK171F01	Cap, Rubber
22(Except XAL)		RJA23ZC	AC Cord
22(XAL only)		QFC1207M	AC Cord
23(Except XAL)		SFUM190-11	Bushing, AC Cord
23(XAL only)		SFUM190-12	Bushing, AC Cord
ACCESSORIES			
A1		SFNU230X01	Instruction Book
PACKING PARTS			
P1(Except XGF) **P1**(XGF only)		SFHP231X01 SFHP231J01	Carton Carton

NOTES: 1. Part numbers are indicated on most mechanical parts. Please use this part number for parts orders.

2. SL-230 (XGE)⟶(XGE)
SL-230 (X)　⟶(X)
SL-230 (XGF)⟶(XGF)

Ref. No.		Part No.	Part Name & Description
ACCESSORIES			
A1 (Except XGE) **A1** (XGE only) A2 A3 **A4** (X only)		SFNU230X01 SFNU230G01 SFWE212-01 SFDK100G SFDK119118	Instruction Book Instruction Book Adaptor, 45 r.p.m. Adaptor, DIN-PIN 2-PIN Plug
PACKING PARTS			
P1 (Except XGF) **P1** (XGF only) P2 P3 P4 P5 P6 P7 P8 P9 P9-1 P9-2 P9-3		SFHP230X01 SFHP230J01 SFHH212-01 SFHH212-02 SFHD212-01 SFHD212-02 SFHH212-03 SFHD212-03 SFYC22A30 SFYF60A60 SFYH60X60 SFYH40X45 SPP189	Carton Carton Pad, Front Pad, Rear Pad, Top Pad, Turntable Parts Box Pad, Top, Parts Box Polyethylene Cover, Parts Box Polyethylene Bag, Player Unit Polyethylene Bag, Dust Cover Polyethylene Bag, Turntable Polyethylene Bag, Cord

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